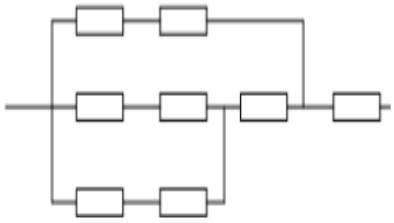
Home Work

Level: 1st Year **Material: Electricity**	**First Name and Last Name:…… Group:** **Deadline for this work is : December 14, 2025**

Instructions:

- Tick the correct answers.
- Do not overfill the answer boxes.

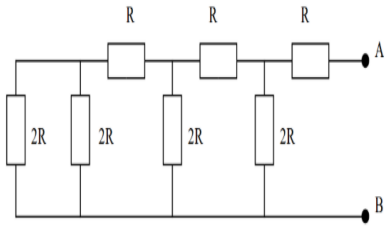
Question 1 : In the following circuit, all resistors are equal to R. The equivalent resistance value is equal to:



Justify :

☐ R ☐ 2R ☐ 6R ☐ 3R

Question 2 : When resistance R=5Ω, the equivalent resistance between A and B is then equal to :

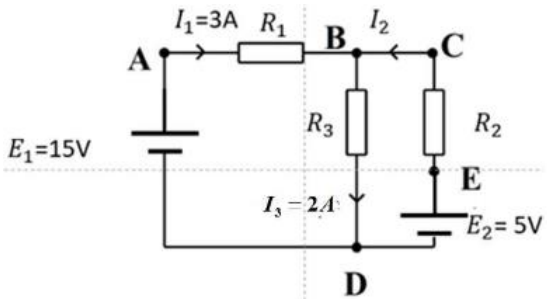


Justify :

☐ 20 KΩ ☐ 5 KΩ

☐ 10 KΩ ☐ 15 KΩ

Question 3 : In the case of U_{BD}=10V, the current I_2, voltages U_{AB} et U_{EC} are equal to :



☐ $I_2 = -1A, U_{AB} = 5V, U_{EC} = 5V$

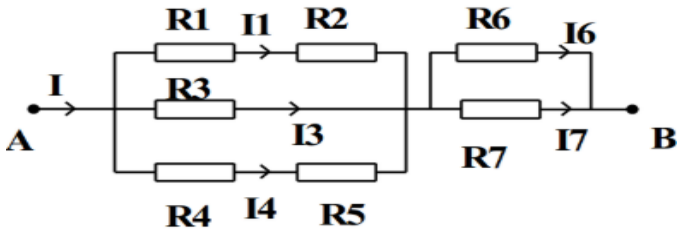
☐ $I_2 = 1A, U_{AB} = 5V, U_{EC} = -5V$

☐ $I_2 = -1A, U_{AB} = 5V, U_{EC} = -5V$

☐ $I_2 = 1A, U_{AB} = -5V, U_{EC} = 5V$

Justify:

Question 4 : In the circuit below, the resistance and current values are:



$R_1 = R_7 = 6\Omega$; $R_3 = 10\Omega$; $R_2 = R_6 = 4\Omega$; $R_4 = 12\Omega$; $R_5 = 10\Omega$ and $I = 4A$

By judiciously applying Kirchhoff's laws and others, calculate the voltages U_{AB}, U_{R67}, U_{R12345} and Calculate the currents in each branch.

……
……
……
……
……
……

Question 5 : Select the correct answer

1. The complex impedance of an inductance is:

☐ Lω
☐ jLω
☐ -jLω

2. The complex impedance of a capacitor is:

☐ $jC\omega$ ☐ $\frac{1}{jC\omega}$
☐ $-jC\omega$

3. A capacitor introduces a phase shift of:

☐ 90° ☐ 0° ☐ -90°

4. Circle the correct answer

Expressions	1	2	3
Complex impedance for R & L in series is:	$R + L\omega$	$R + jL\omega$	$\frac{jRL\omega}{R + jL\omega}$
Complex impedance for R & C in parallel is:	$\frac{1}{R + jC\omega}$	$\frac{R}{1 + jRC\omega}$	$\frac{1}{R + C\omega}$

First Name and Last Name:…… Group:

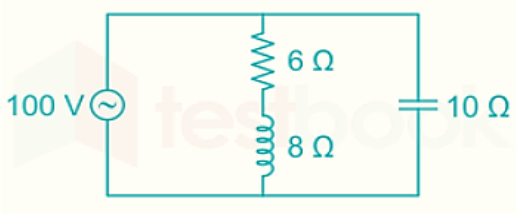
Question 6:

A 120V, 20Hz source supplies a series circuit consisting of a 5Ω capacitive reactance, a 1.6 Ω resistor, and a coil with resistance and inductive reactance of 3Ω and 1.2Ω respectively. The expression for the voltage and currents on the terminals of the impedance in polar form are:

- ☐ $(85.84\angle 0° ; 3.64\angle -15.95°)$
- ☐ $(120\angle 15.95° ; 3.64\angle 0°)$
- ☐ $(84.85\angle 0° ; 3.64\angle -15.95°)$
- ☐ $(120\angle 0° ; 3.64\angle -15.95°)$
- ☐ None

Justify :

Question 7: Identify the status of this circuit:



- ☐ Inductive
- ☐ Capacitive
- ☐ At resonance
- ☐ Resistive

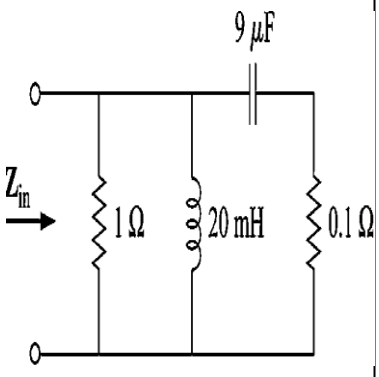
Justify :

Question 8 : For the circuit, find the resonant frequency ωo, Zin and the value of Zin at ωo.

Zin:

ωo:

Zin (ωo)



First Name and Last Name:..... **Group:**

Exercise N°1:

1- Find out if there is a value of C to reach resonance at $f_0 = 2500/\pi\ Hz$
$R1 = 8\Omega$, $R2 = 8.34\ \Omega$ and $Z_L = j\ 8\ [\Omega]$ (circuit in fig a)

2- Determine the resonance frequency of the circuit (see fig b) and calculate the value of current at the resonance. **Given** : $V_m = 20\text{V}$

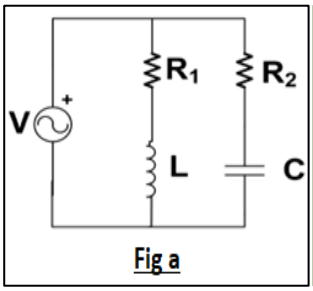


Fig a

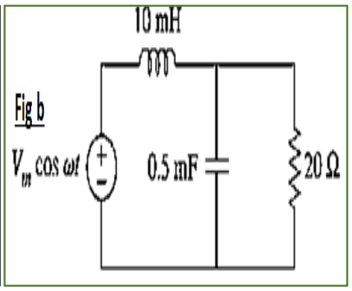


Fig b

1- **Value of C** **(fig a)**

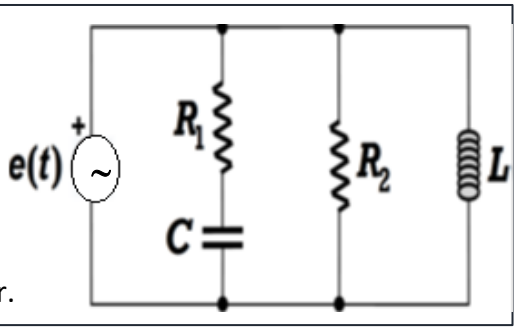
2- **Resonance frequency** **(b)**

3- **Value of current at the resonance**

Exercise N°2:

Consider the electrical circuit shown in the figure with:

$e(t) = 30\sqrt{2}\cos\omega t\,[\mathrm{V}]$, $X_C = R_1 = 100\,\Omega$ & $X_L = R_2 = 200\,\Omega$



1. Calculate the equivalent admittance of the circuit.
2. Deduct the phase shift of the circuit.
3. Calculate all the currents in the circuit.
4. Using two different methods, calculate the active power.

1- Equivalent admittance of the circuit

2- Phase shift of the circuit

3- Currents in the circuit :

4- Active power

Exercise N°3: Use Superposition theorem to find the voltage V in the network shown in Fig a.